Space Weather Forecast

Issued on Saturday, 10 December 2022 at 12:34 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Increasing Chance of Moderate-class X-ray flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with an erratic X-ray trace showing occasional bouts of middling Common-class flares. The largest of these flares was observed at 09/1413UTC from a newly-arrived region on the Earth-facing side near the southeastern solar horizon. This group appears to be largely responsible for the uptick seen in X-ray activity over the last 30 hours, and further rotation may yet reveal more detail here.

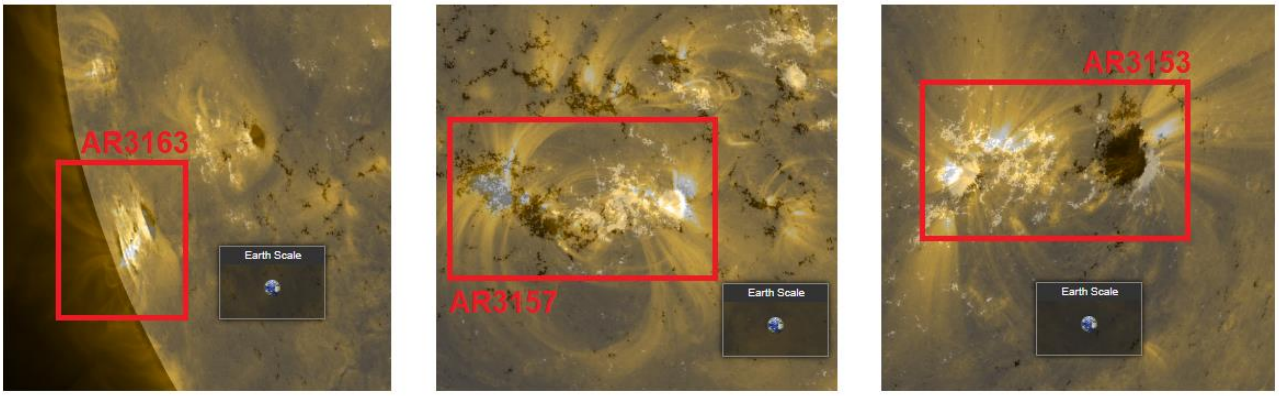

Figure 1: Helioviewer.org derived composite extreme UV and magnetic satellite imagery, showing the three main active sunspot regions on the current Sun (boxed red, with their sunspot numbering also shown). Earth is also shown for scale.

The above was one of up to eight sunspot regions on the Sun. This roster continued to include the very large southwestern quadrant sunspot, although this showed a tendency towards becoming more symmetric and with fewer intermediate spots visible (suggesting flares are now less likely). Also of note was a group in the central northern solar hemisphere, which showed mobile intermediate spots, but these ceased to be generated. All the other sunspot regions were either magnetically 'unipolar' or else simple dipoles with small changes evident.

There were no obvious movements in front-sided 'filaments' (arcs of plasma) in the period, and while the new southeastern region appears to have produced some small Coronal Mass Ejections (CMEs), these do not carry an Earth-directed component. No Earth-bound CMEs were observed in the period.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of an ongoing, slightly

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weakening connection to a fast wind.

The solar wind speed was Elevated at first, but gradually fell to Slightly Elevated levels with time. Both the number of particles associated with the solar wind and their magnetic field were small-scale and unremarkable.

The net result of the above solar wind measures was for mostly quiet geomagnetic activity.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a chance of isolated Moderate-class X-ray flares each day, currently most likely from newly-designated sunspot but also the two other nominally complex regions on the Sun. Further arriving regions into the coming UTC working week should see the risk of significant flares increase slightly further still.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs currently feature in the forecast.

The coming four days are potentially bookended by 'coronal hole' fast winds, although even at peak Minor Geomagnetic storm conditions are not expected. The most reliably quiet conditions should separate the two fast winds on Monday 12 December.

Energetic Particles / Solar Radiation: No solar radiation storms are expected. This being said, there is a daily slight chance of seeing S1+ levels if any significant X-ray flares were to occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	30	35	40	40
Very Active	R3 to R5 X	No	1	2	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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